



Restoration Alternatives for the Salton Sea

The Salton Sea—California's Largest Lake

367 square miles

35 miles long, 15 miles wide, 51 feet deep



The Gulf of California 12 million years ago



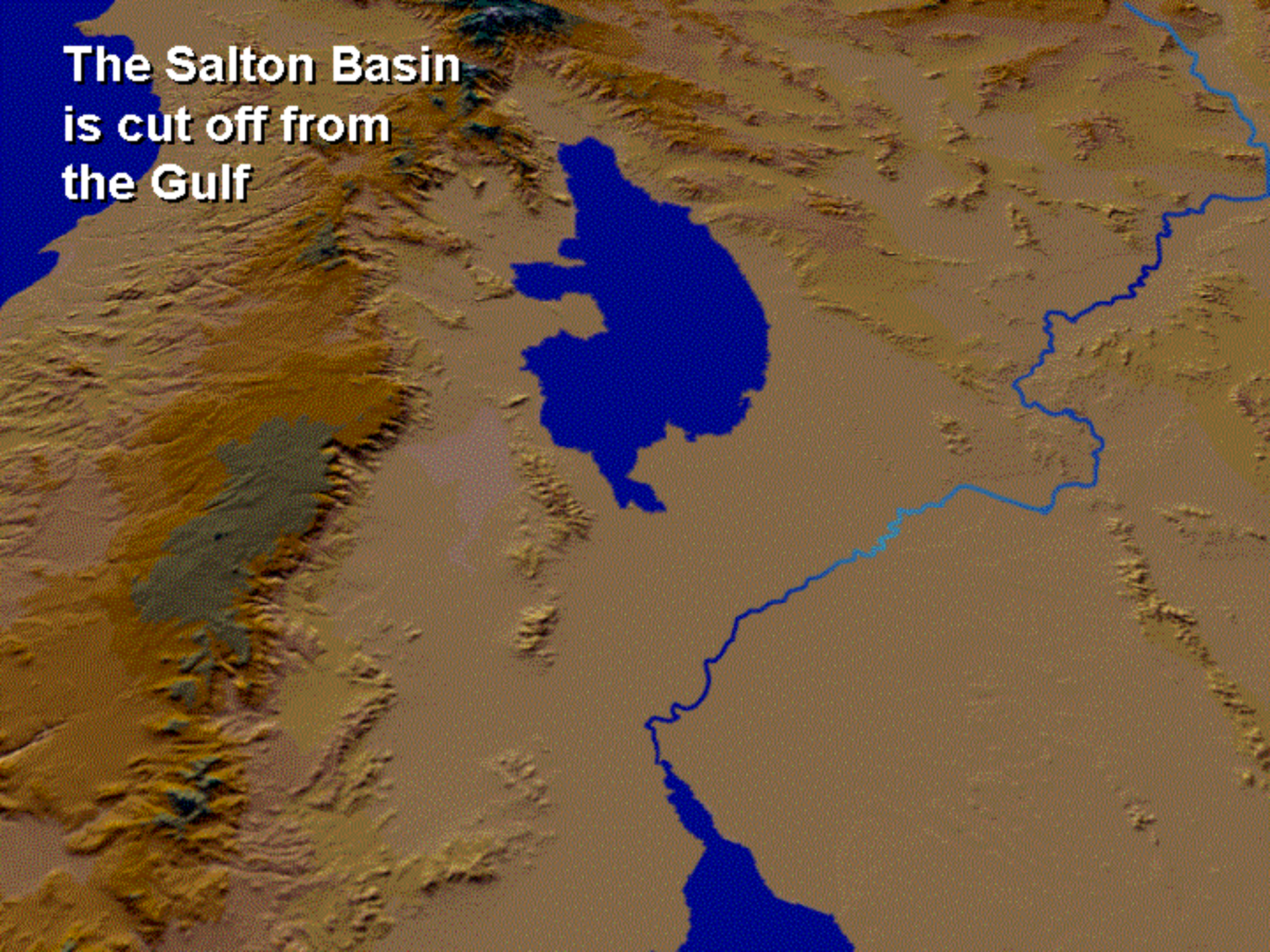
**Sediments start
to fill in the Gulf**



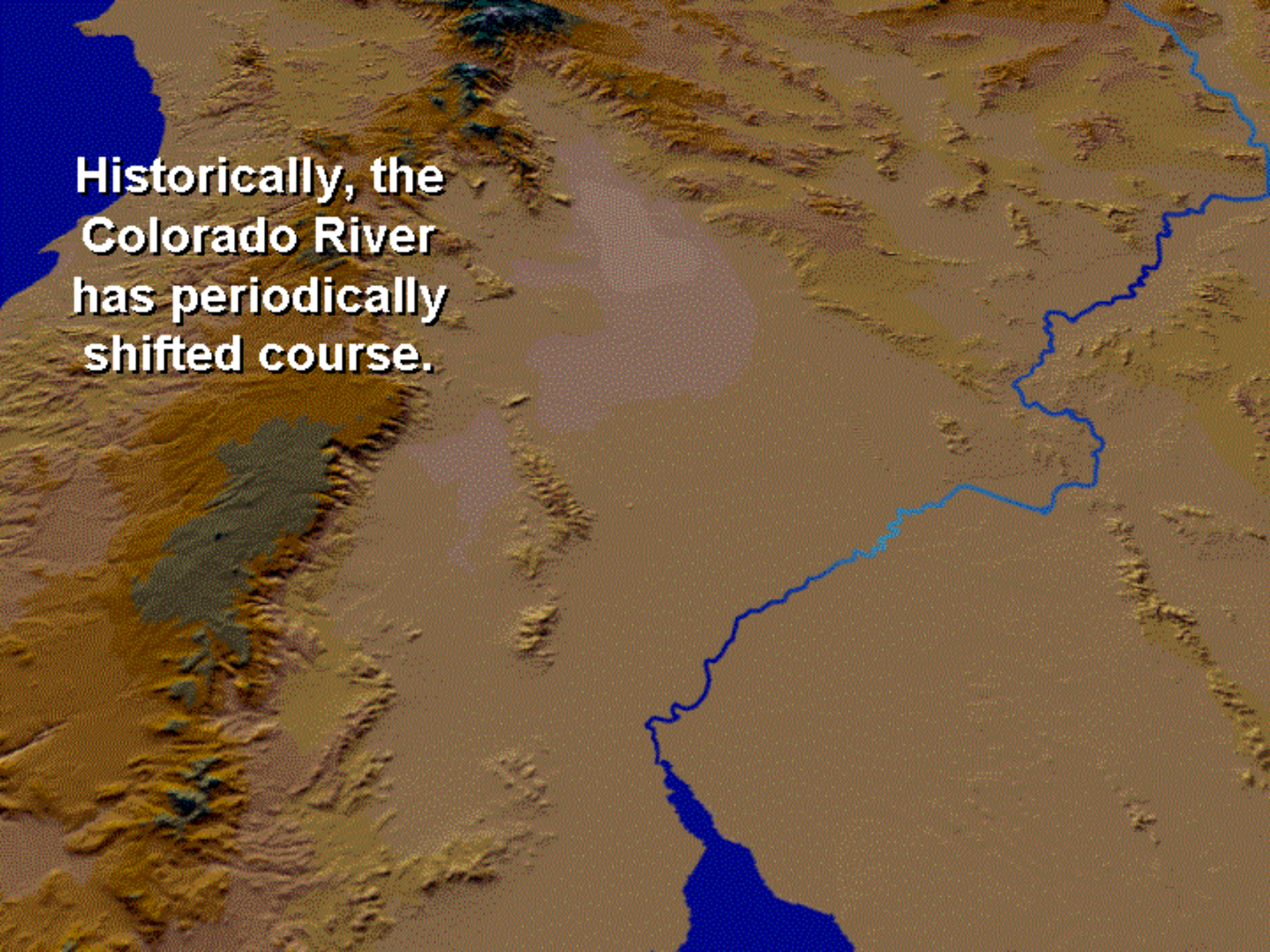
**Sediments from the
Grand Canyon and
Colorado Plateau
fill in the Gulf**



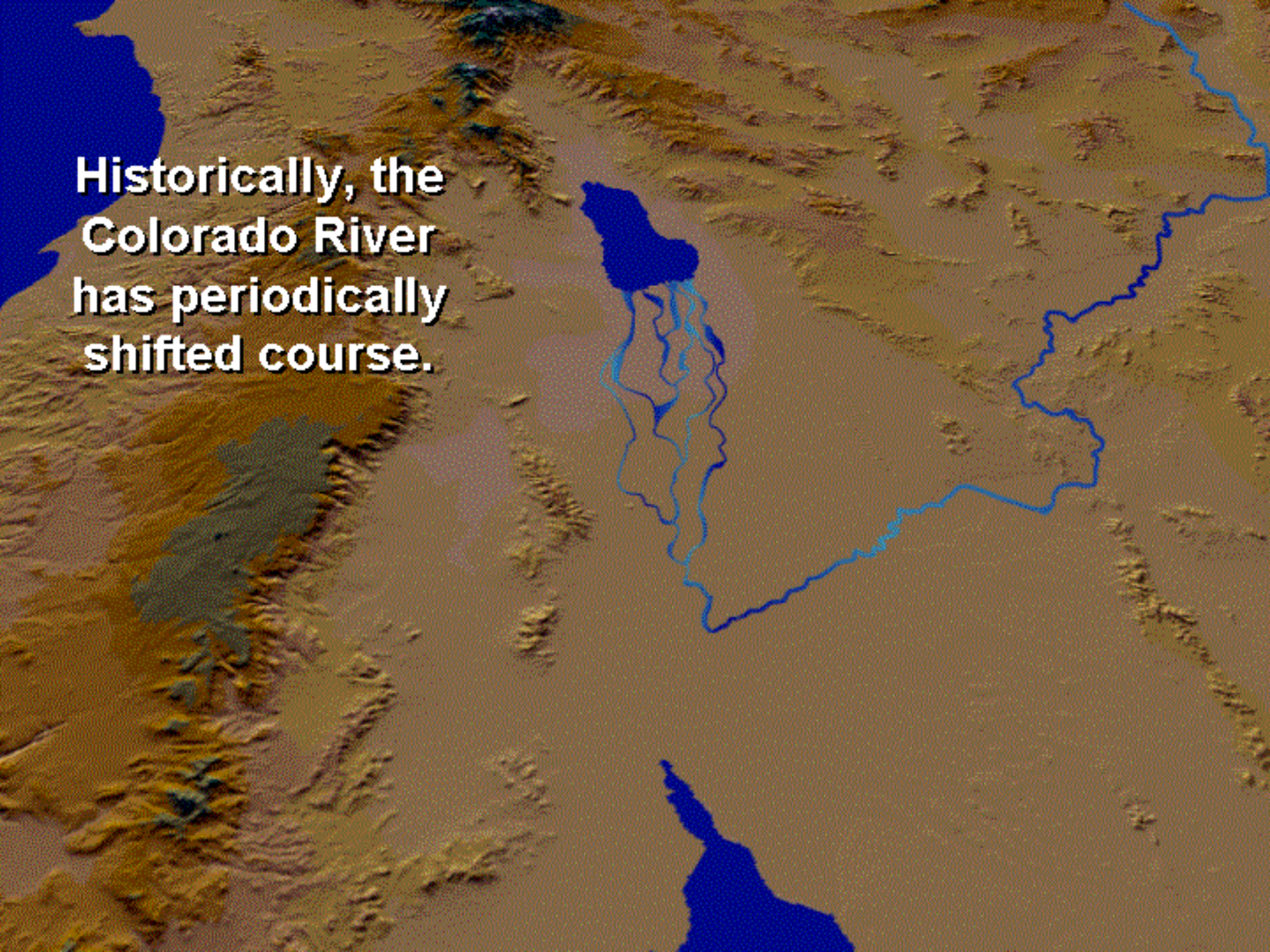
**The Salton Basin
is cut off from
the Gulf**



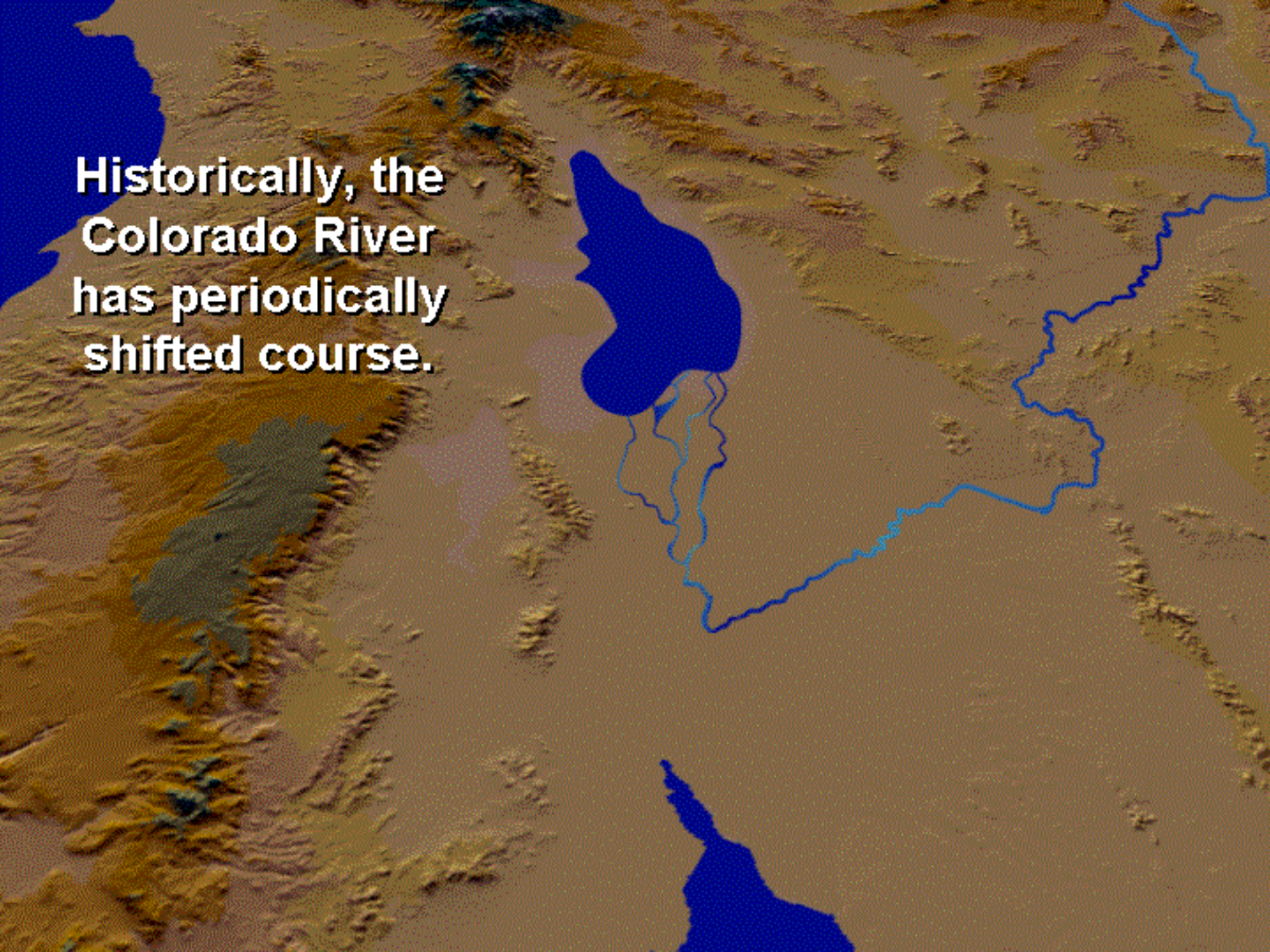
**Historically, the
Colorado River
has periodically
shifted course.**



**Historically, the
Colorado River
has periodically
shifted course.**



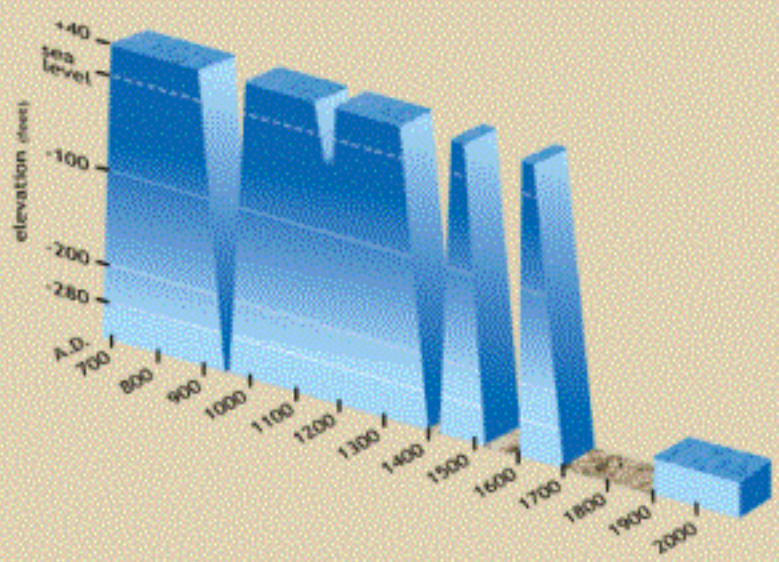
**Historically, the
Colorado River
has periodically
shifted course.**



Ancient shoreline



Lake Cahuilla periodicity



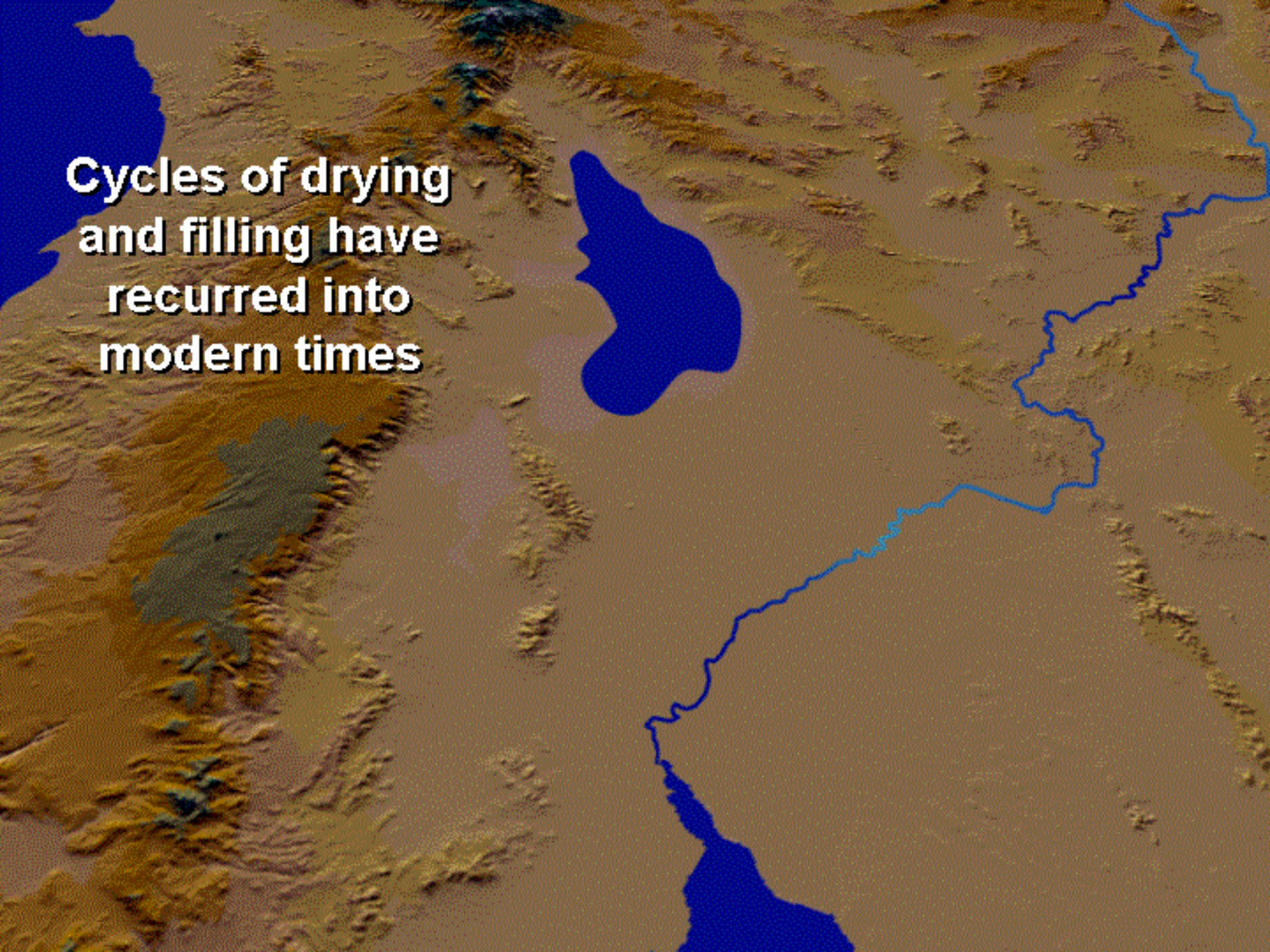
At 39 ft above sea level, Lake Cahuilla would spill over into the Gulf



**Cycles of drying
and filling have
recurred into
modern times**



**Cycles of drying
and filling have
recurred into
modern times**




**Cycles of drying
and filling have
recurred into
modern times**

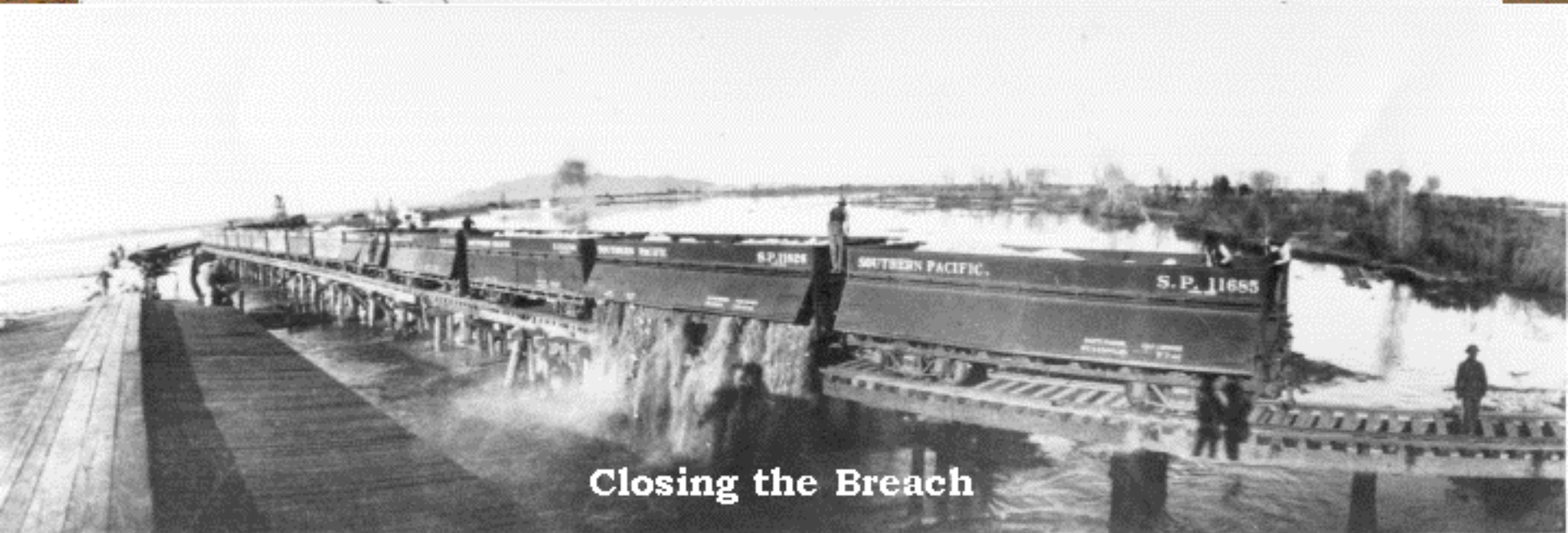


**By the late 1800s,
the lakebed was
mostly dry**





In 1905, a series
of floods tore a
breach in a
diversion canal



Closing the Breach

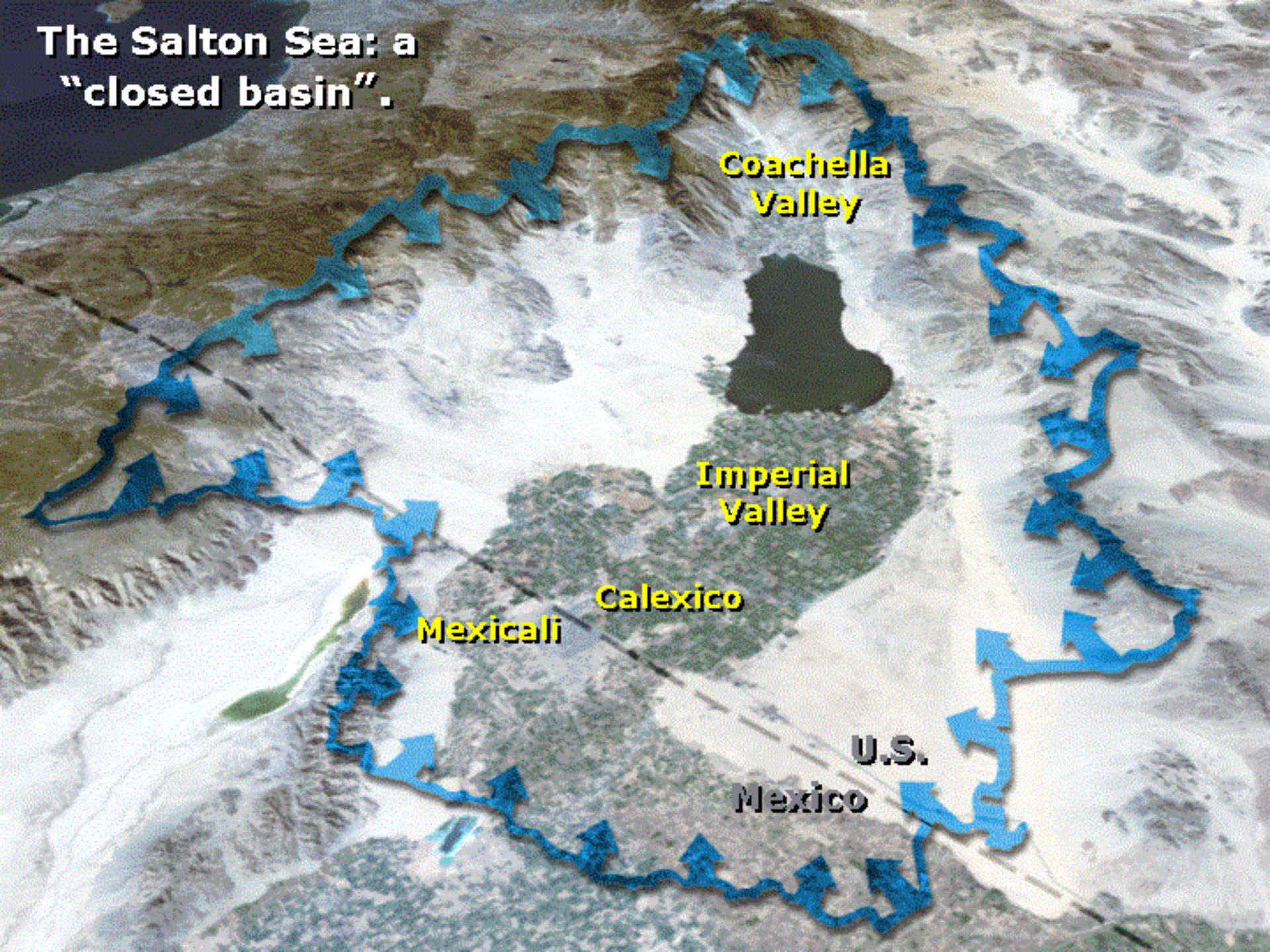
**Today, the Sea is
sustained by
agricultural
drainage**

Coastal Canal

All-American Canal



**The Salton Sea: a
"closed basin".**



**Coachella
Valley**

**Imperial
Valley**

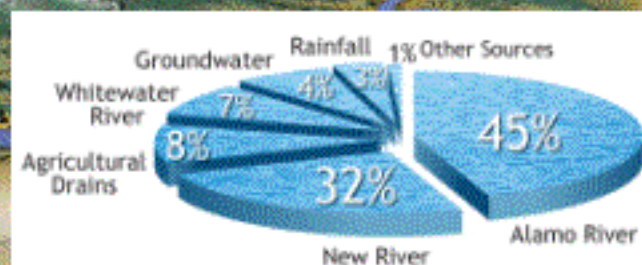
Calexico

Mexicali

**U.S.
Mexico**

Salton Sea Hydrology

Sources of water to the sea include rainfall, groundwater, urban runoff, and agricultural runoff.



Whitewater River 7%

Other inflow 1%

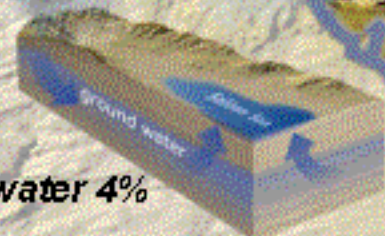
Alamo River 45%

Agricultural runoff

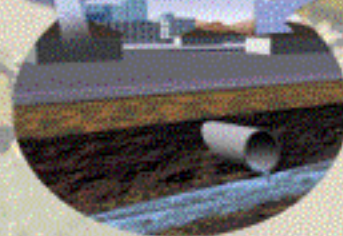
Agricultural Drains 8%

New River 32%

Rainfall 3%



Groundwater 4%



Urban runoff

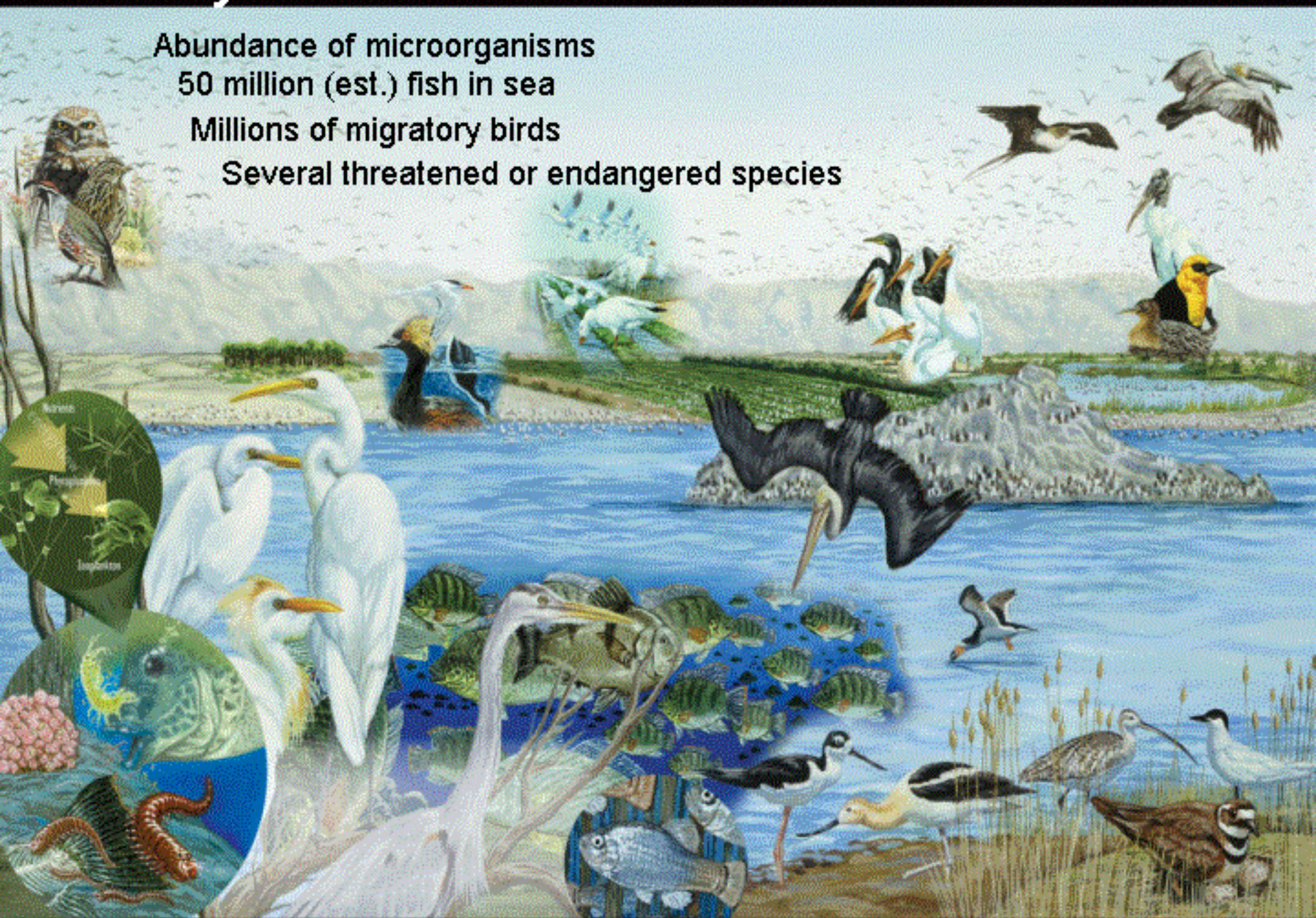
Diversity of Life

Abundance of microorganisms

50 million (est.) fish in sea

Millions of migratory birds

Several threatened or endangered species



Salton Sea Fishery



Study: Salton Sea fishery healthier than previously believed

TOM VERDIN, Associated Press Writer

(04-20) 14:14 PDT SALTON CITY, Calif. (AP) -- New research disputes the widely held view that the Salton Sea, California's largest lake, is a chemical sump on the verge of ecological collapse.

The Salton Sea, the subject of intense restoration efforts, is home to one of the most productive fisheries in the world, and its fish appear healthier than previously thought, according to a new study.

It is the first broad study of the sea's fishery in half a century and comes after a separate analysis last year found no measurable amounts of herbicides or pesticides in the muck at the lake's bottom.

"We're coming to a consensus that the popularly conceived notions that the Salton Sea is dead or is dying are totally out of whack. If anything, the

be submitted by the
Sea Authority, the
coordinating resto
Interior Departme

Periodic bird and
Salton Sea and th
have captured pul
years.

But Costa-Pierce
researchers, who
January 1999, fou
and their apparen
"pretty much of a

The study found th
mile-long sea pro
almost anywhere
said Costa-Pierce
National Oceanic
Administration's
Mississippi and A

The findings are n

Salton Sea International Avian Airport

MORE THAN 400 BIRDS
301 TO 400
101 TO 300
1 TO 100



Number of Banded Birds

Scientists at the University of Redlands expected the bird banding data to illustrate the importance of the Salton Sea for birds migrating along the Pacific Flyway. However, the data clearly show a much broader significance of the Sea for migrating birds across all of Western North America.

20,000 bird band records

Birds recovered from as far away as Russia and Peru

2/3 of all migrating birds in the continental U.S. visit the Salton Sea



Values Of Agriculture and Recreation

America's Winter 'Bread Basket'
Over 6 million acres of farmland



\$1.5 billion
annual industry



200,000 visitors annually



Bird watching, boating,
fishing, and more



Salt Concentrations

Salton Sea Water
44,000 mg/l

Ocean Water
35,000 mg/l

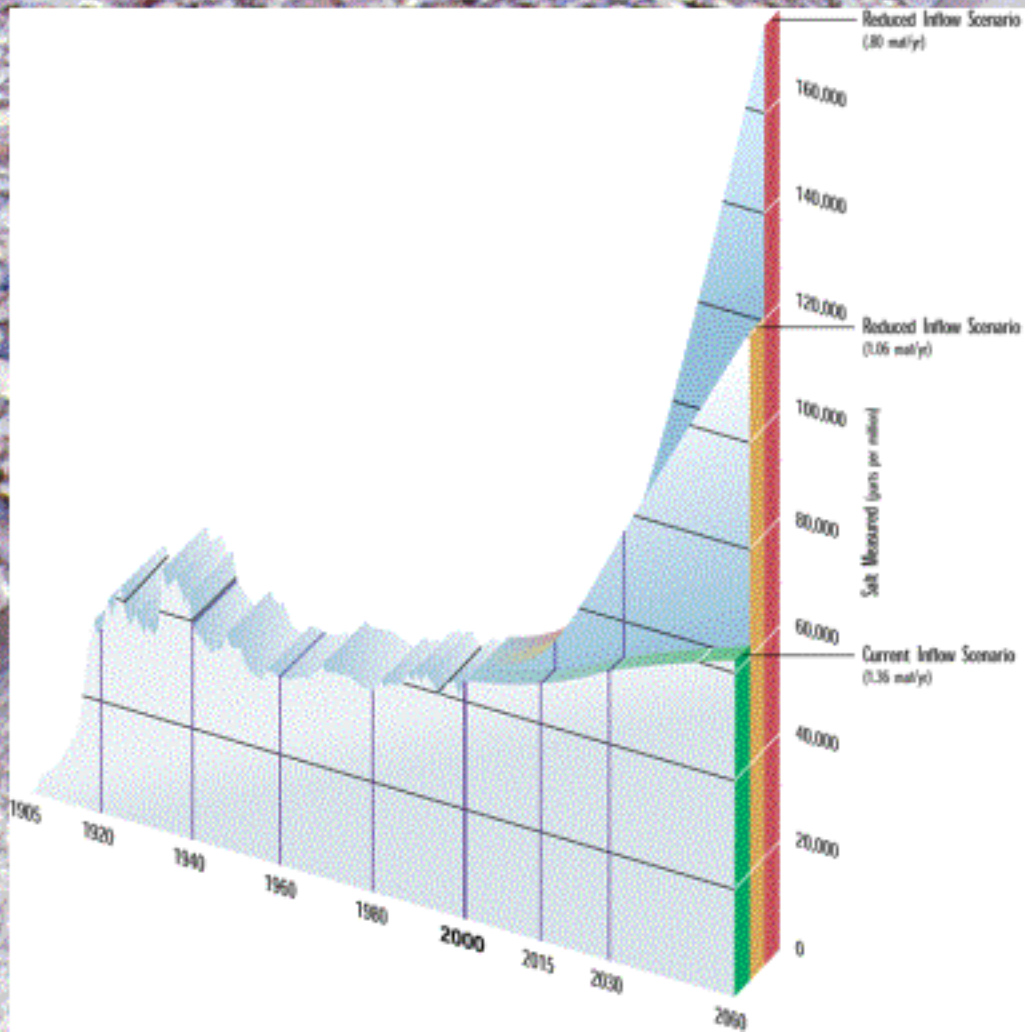
Tributary Inflow
Water, **2,000 mg/l**

Colorado River
Water, **800 mg/l**



Impacts on Wildlife

Rising Salinity
Fishery Collapse
Bird Die Offs



Restoration Alternatives

Restoration Goals

- Maintain for agricultural drainage
- Safe environment for birds
- Restore recreational uses
- Maintain viable fishery
- Enhance economic development

**Solar
Evaporation
Ponds**



**Paid not
to farm**



**Enhanced
Evaporation
System (EES)**



Restoration Alternatives

On-Water Fish Recovery Project



Restoration Alternatives

Evaporation Ponds

Distance From Urban Areas



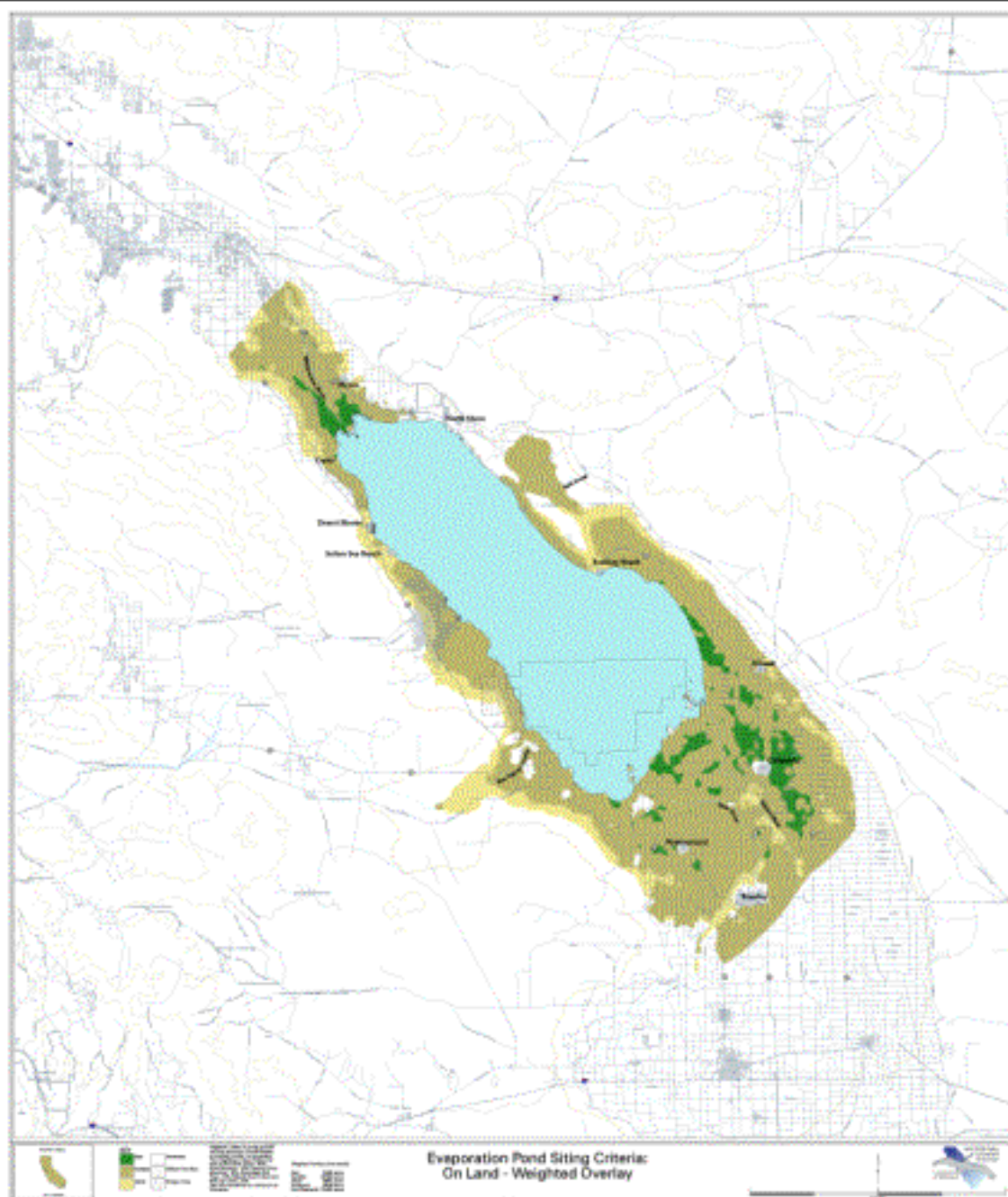
Distance From Shoreline



Slope



Hydrologic Soil Group

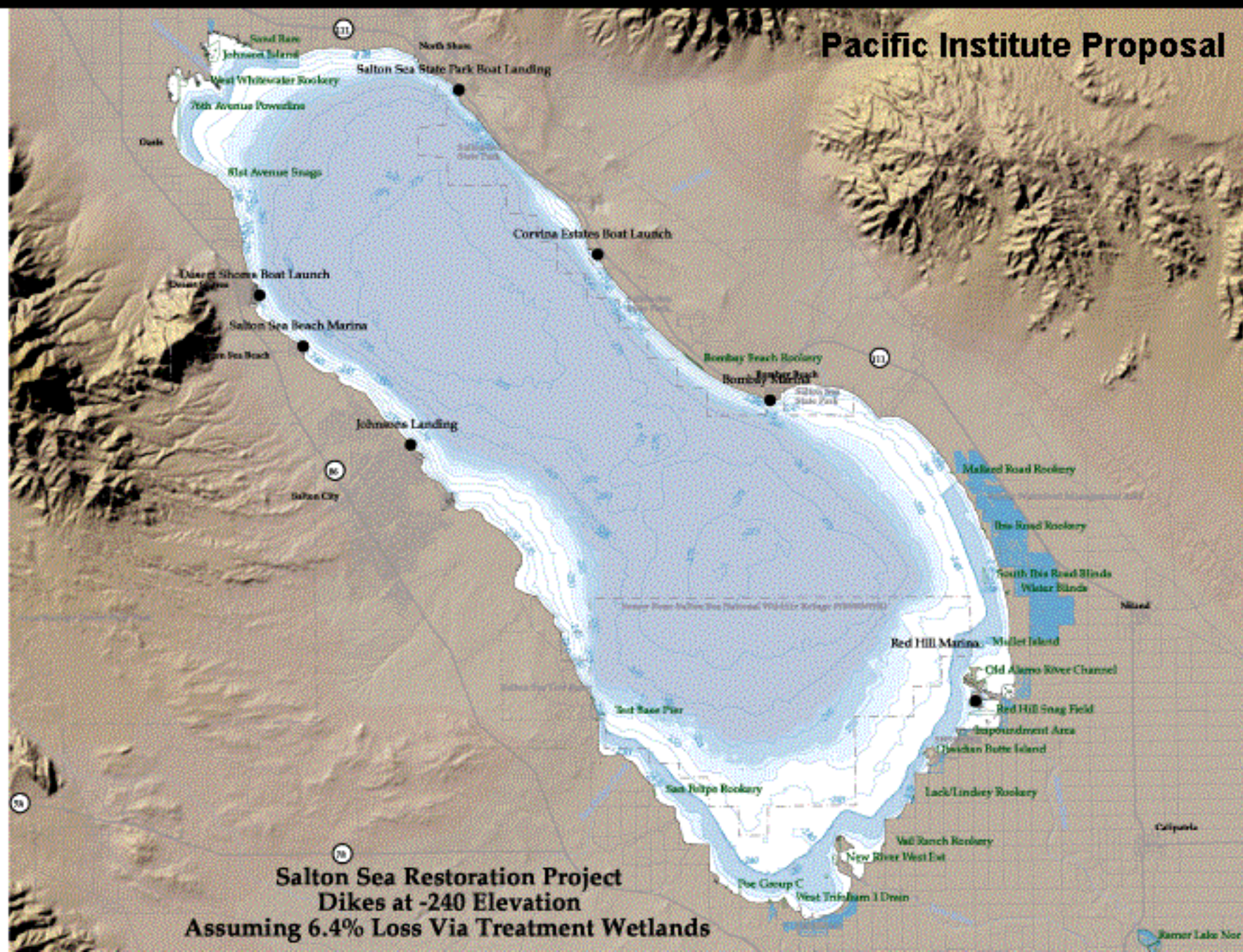


Restoration Alternatives

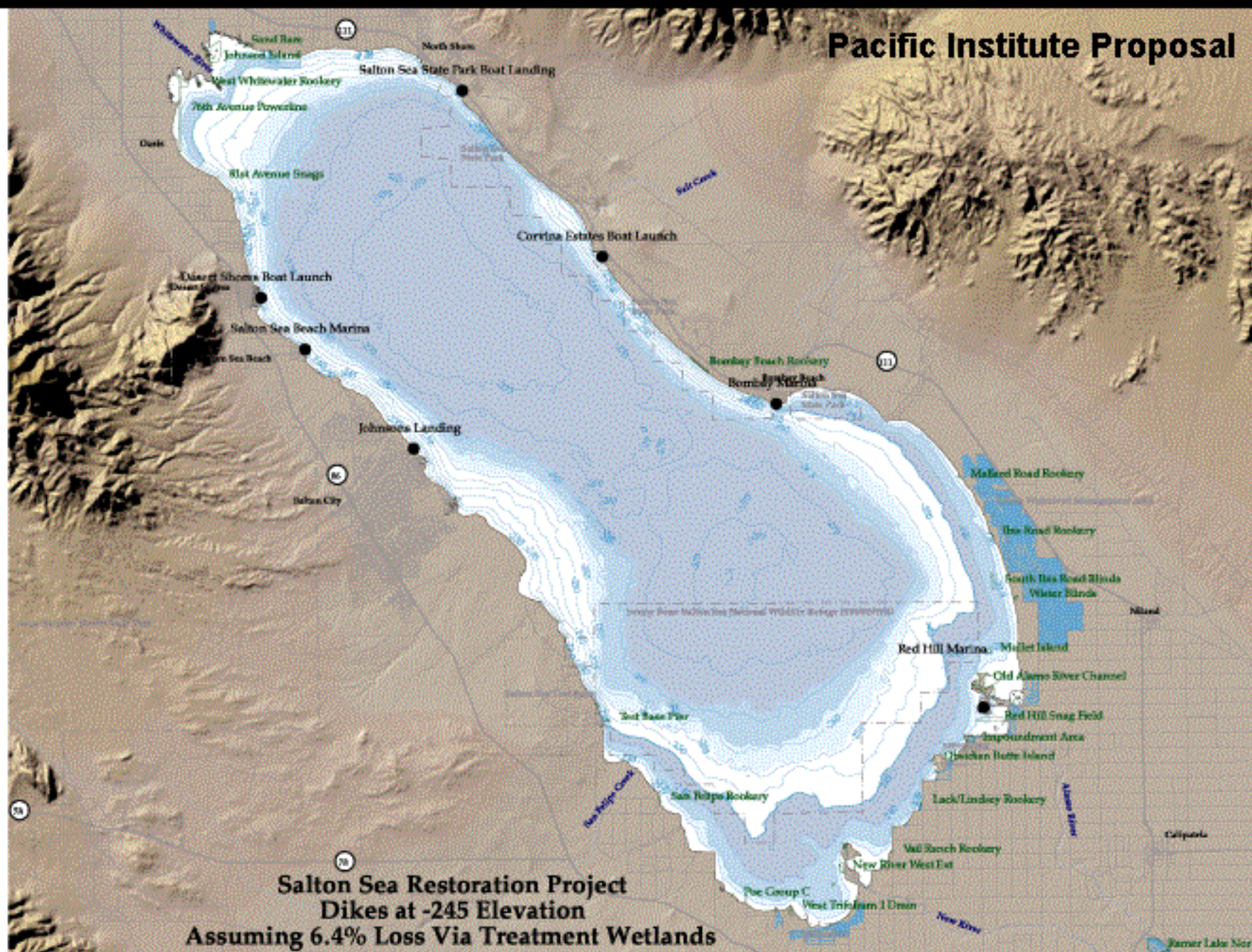
Evaporation Ponds



Restoration Alternatives



Pacific Institute Proposal



Restoration Alternatives

US Filter "Salton River" Proposal



Restoration Alternatives



Restoration Alternatives



500,000 acre-foot
water transfer

To CRA

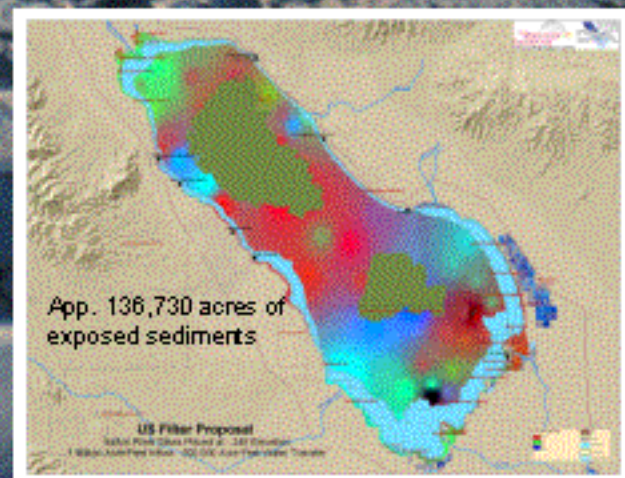
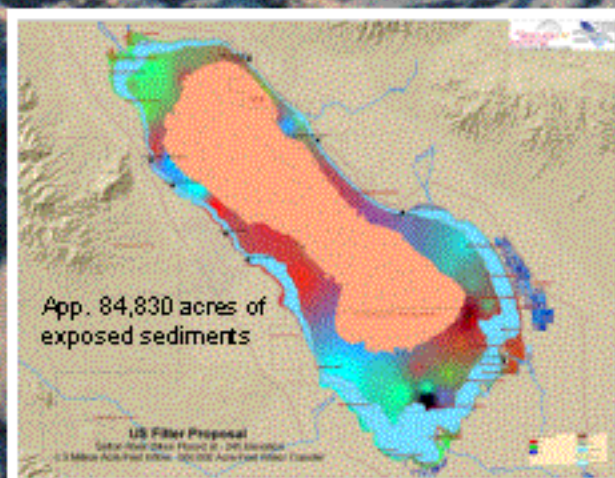
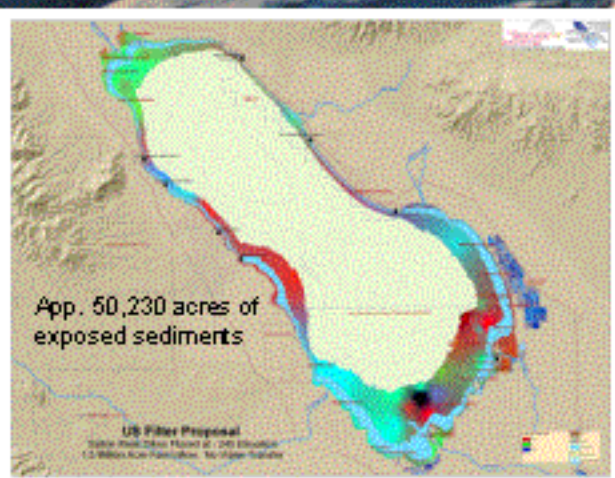
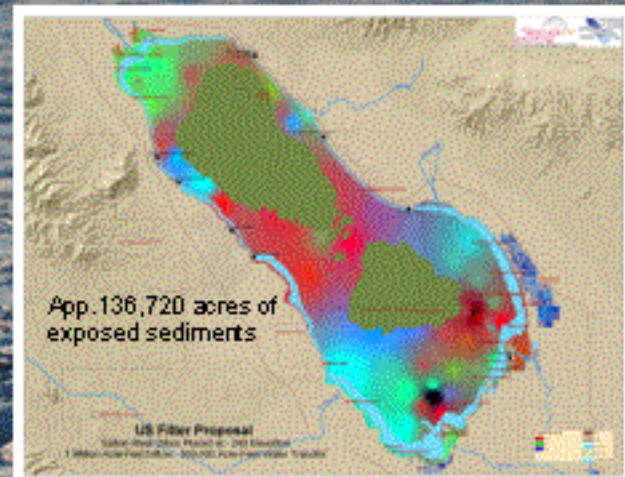
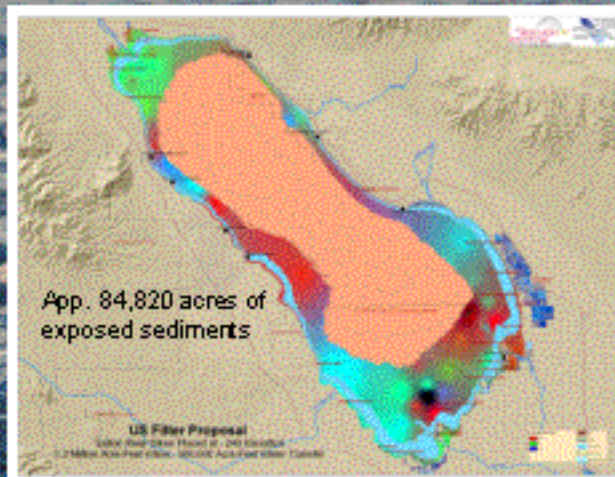
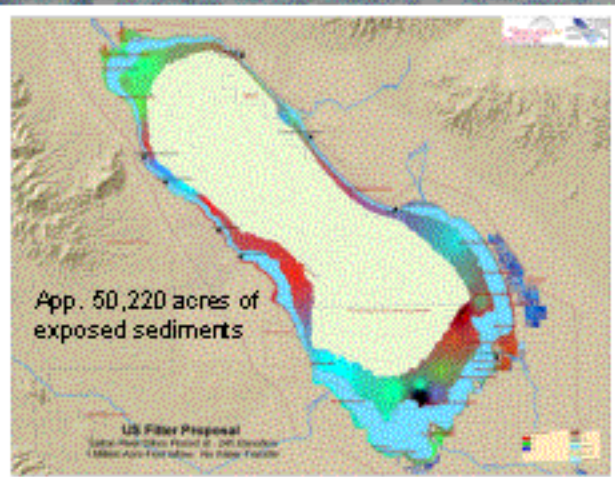
Scenario Shown:
1.3 Million Acre – Feet Inflow,
500,000 Acre – Feet Water Transfer

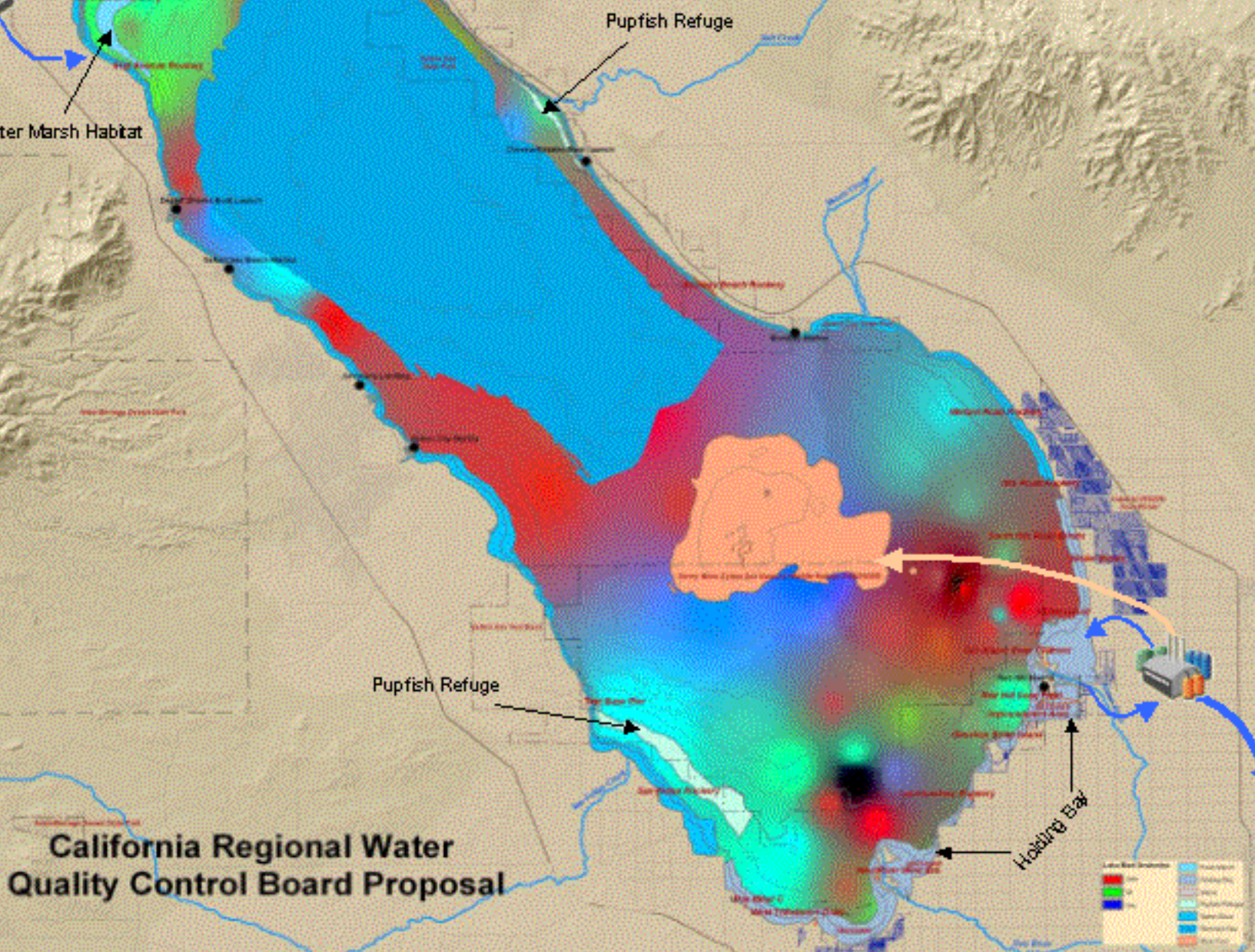
Impacts on Air Quality

Particulate Matter Due to Dry Lake Bed

- Very fine particles penetrate deep into the lungs and can travel long distances
- Studies link PM10 to respiratory disease
- May contain cancer-causing chemicals such as cadmium, arsenic, and others







California Regional Water Quality Control Board Proposal